

What is the key medical information required to care for a transferred neonate appropriately? – A best evidence topic (BET)

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Keywords (MeSH): Infant, newborn; referral letter; communication; template; endorsement; developing countries; Rwanda

Scenario: You are a pediatric resident on night duty at a referral hospital in Rwanda when you receive a neonate transferred from a district hospital 130 kilometres away. The neonate is a 2-day-old female born at 33 weeks gestation with a birth weight of 1.9 kg, as documented on her referral letter. The neonate has respiratory distress and is referred for respiratory support. The referral letter does not include information about the neonate's history or the care given at the referring hospital. You note that specific clinical data (e.g. maternal history, delivery details, resuscitation measures provided, medications given, respiratory support initiated, etc.) are lacking in the referral letter from the sending hospital. You consider that having this information readily available could expedite the type of care you provide for this neonate. You ask yourself the question: does the timely sharing of core clinical information enhance the efficiency and the quality of the clinical care you seek to provide for referred neonates?

What is already known? Critically ill neonates are at higher risk of complications during transport compared to older children due to their size, temperature instability, potentially immature cardiorespiratory functions, and their risk for infection and hypoglycemia. The transport of neonates between healthcare facilities is associated with increased mortality and morbidity during transport and at the destination hospital [1]. It is difficult to establish if this is because the transport itself is dangerous or that the requirement of transport indicates a more severe degree of illness in the neonate or a combination of both. Timely and safe transport of patients and good communication between facilities increases the level of preparedness for the immediate best care of the referred neonate, thus preventing gaps in patient care. Indeed, evidence suggests that a coordinated referral system can positively impact the outcome of transported neonates [2].

Countries with more advanced neonatal care have standardized Neonatal Referral Forms (NRFs) to aid the continuity of care of neonates and children. These communication tools help to ensure essential medical information about the neonate is shared between the referring and receiving hospitals [3-5].

In Rwanda, the transport system utilizes general patient referral forms but does not place special attention on children or neonates. Private and public district hospitals use different communication tools to transmit patients' information to the receiving clinicians [6], but the patient data are inconsistent. Thus, there is a lack of standardization to facilitate inter-facility communication for referred neonates.

Structured PICO Clinical Question [7]: In a critically ill neonate who requires transfer to a referral hospital [P - population], what is the core clinical information [I - interesting thing] needed to optimize care at the referral center [O - primary outcome] and how does this impact neonatal morbidity and mortality [O - secondary outcome]?

What would be the optimal study design to answer this PICO question? When searching for information in order to answer this PICO question, we seek to determine the core clinical information (CCI) required on an NRF in order to improve information sharing. A consensus of the opinions of experts (e.g., Delphi method) or a qualitative study (e.g., focus group) would be the optimal study design for identifying the CCI for such a communication tool.

Full search description

A literature search was performed using the search terms in Table 1. The search was limited to studies in humans, neonates (0-28 days of life), and manuscripts available in the English language

Corresponding author: mosenga2000@gmail.com; **Potential Conflicts of Interest (Col):** All authors: no potential conflicts of interest disclosed; **Funding:** All authors: no funding was disclosed; **Academic Integrity:** All authors confirm that they have made substantial academic contributions to this manuscript as defined by the ICMJE; **Ethics of human subject participation:** Not required for a BET. **Originality:** All authors: this manuscript is original has not been published elsewhere; **Review:** This manuscript was peer-reviewed by three reviewers in a double-blind review process; **Original submission:** 25th March 2018; **Original decision:** 30th June 2018; **Revised submission:** 7th November 2018; **Revised submission accepted:** 17th November 2018

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(search date: March 10, 2017). This initial search produced more than 6000 articles. The “developing countries” search string was therefore added revealing 201 articles, of which three were relevant [1], [8], [9]. The references of these relevant articles were reviewed and produced an additional four articles [10]–[13] (Table 2). An automated email update was set up on PubMed during the process of writing this manuscript to ensure no new articles were missed at the time of publication as the standard recommends [14].

Commentary: We sought to identify from the literature the CCI that should be communicated between hospital sites during the transfer of a neonate. Due to the limited number of relevant studies, our search did not produce an adequate list of data points that could enable the communication of clinical information regarding a transported neonate.

Reviewing the identified literature, specific studies did suggest that the following items be included in referral letters/notes, but these are not neonate-specific [12, 13, 15, 16]:

Name and age of the patient; Date and time of referral; Reason for referral; Succinct history of the problem; Provisional diagnosis; Treatment that has been given; Co-morbidities and treatments for these; Immunizations given [17]; What role the referring doctor expects to play; involvement of other doctors; other opinions on management; Any factors possibly mitigating against particular treatments or treatment arrangements and special considerations, e.g., psychiatric/social problems, concerns regarding compliance or patient understanding, need for an interpreter, and any concerns/wishes of patient's family.

Wrapping it up: The transfer of a critically ill neonate is fraught with potential complications that could negatively impact morbidity and mortality. Care for this fragile patient population can be improved when the transition of care, including the handover of clinically relevant information, is seamless. We conducted a literature search to determine what core clinical information needs to be shared between hospital sites when transferring a neonate. To date, there have been no studies describing this. However, communication tools in other specialties have increased the quality of shared information between providers. Finally, it has been found that the quality of the shared clinical information reduces repetition of investigations and treatments, thus decreasing the cost to families [11].

What next? Currently there is no clear literature regarding the required CCI when transferring a neonate. There is therefore a gap in the literature. A robust study is required to identify what is the core clinical information required when receiving a critically ill neonate at a referral center in a resource-limited setting, such as Rwanda.

Once the items of CCI have been identified, standardized NRFs are required to optimally share this information. These NRFs should be adapted for individual countries' needs and for specific patient populations. Once this is established, a study identifying if communication using a standardized NRF results in improved outcomes for transferred neonates will be needed.

Table 1: Search terms (MeSH terms in italics)

	(Premature birth OR infant, premature OR infant, extremely premature OR infant, newborn OR premature OR prematurity OR premature OR neonate OR Infant, Low Birth Weight OR Infant OR Infant care)
AND	(patient hand off OR patient transfer OR patient transport OR transportation of patients)
AND	(Developing Countries OR developing country OR countries, developing OR nations, developing OR developing nations OR poverty OR resource poor country OR resource-poor country OR low-income country OR low-income country OR Global Health OR third world OR India OR Africa OR Asia OR South America OR Papua New Guinea OR Asia-Pacific)
NOT	(Surfactant OR trauma OR surgery OR neurosurgery OR in-utero OR in utero OR prenatal OR gene OR genetic OR genetics OR outbreak OR fertility OR embryo OR cpap OR global health OR congenital anomalies OR congenital malformations OR intensive care OR matern* OR stillbirth*)
Search date	March 10 th 2017, repeated October 5 th 2018 (no new results)

Table 2: Evidence Summary Table (Step 3 – Appraise the evidence)

Author, date, citation, country (Economy) [15]	Study type (Oxford CEBM level of evidence) [16]	Study group Population and comparisons	Key Outcomes	Key Results	Appraisal comments
Pan2017 [8] India (LMIE)	Literature review (Level 4)	No study group	Communication	Transport documentation should include: Original patient medical record, a detailed transfer letter (containing data about parents, maternal history, current pregnancy, the birth process, the child status at birth, intensive care measures and all the investigations done).	A review article. No intervention was undertaken to demonstrate the effectiveness of communication tool on transfer outcomes.
Wåhlberg 2015 [10] Norway (HIE)	Cluster randomized trial (Level 2a)	GP clinics randomized to newly designed, evidence-based referral form (n=281) versus GP using old forms (n=219)	Quality of shared clinical information	Intervention group scored 18 % higher (CI: 11-25%), p < 0.001, on the referral quality score:	Evidence-based referral forms improve the referral quality significantly Non-pediatric/neonatal. The referrals were rated according to a scoring system derived directly from the referral templates used.
Ramanayake 2013 [9] Sri Lanka (LMIE)	Review/opinion piece (Level 4)	No study group	Advantages of a structured letter form	Many listed advantages (saving time and money)	Included a template of a structured letterform. Template not created using scientific/robust methods
Abdulraheem, 2012 [1] Nigeria (LMIE)	Prospective and descriptive cross-sectional study (Level 4)	401 neonates presenting to the children's emergency room of UTH Radius of 80km	Referral letters	65% had referral letters. Only 51% of the referral letters had complete information.	Included even babies who were self-referred from home. Did not include course and outcome in hospital at UTH. Description of referral letters and communication.
			Communication	17% were verbally referred without any letter	
			Status at arrival	4.7% were dead at arrival	
			Complications during transport	35.6 % developed complications (either or apnea, vomiting, reduced activity, seizures)	
Orimadegun 2008 [11] Nigeria (LMIE)	Prospective letter review (Level 4)	Referral letters to Pediatric Specialists (n=974)	WHO standards for pediatric referral letters (ICMI)	Missing information includes examination findings (47.9%), provisional diagnosis (38.6%), history of presenting complaints (36.6%) or reasons for the referral (23.9%),	Shows the need of a letter format, referral form and HCP training on adequate info transfer. Most of the key (WHO recommended [17] medical information was missing
McConnell 1999 [12] Australia (HIE)	Prospective qualitative study (Level 2)	Semi-structured interviews (n=28) and survey (n=319)	Preferences for contents of referral and reply letters	There were some differences in preferred information to put on these letters Templates of these tools were designed	Importance of referral and reply forms Commonly preferred information on these forms Non-pediatric/neonatal.
Couper 1996 [13] South Africa (UMIE)	Interventional, prospective study (Level 2)	Referral letters (n=254) reviewed prior (n=112) and after (n=142) introduction of pro forma letter	Referral letters quality in four domains (total quality score of 4)	Increase in the mean score from 2.9 to 3.4 (p=0.0001)	Importance of a referral form on the quality of information sharing

Income Group (World Bank) [15] Low-income Economy (LIE), Lower-middle-income economy (LMIE), Upper-middle-income economy (UMIE), High-income economy (HIE). University Teaching Hospital (UTH) Newborn (NB) General Hospital (GH) Health Care Professionals (HCP) General practitioner (GP).

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